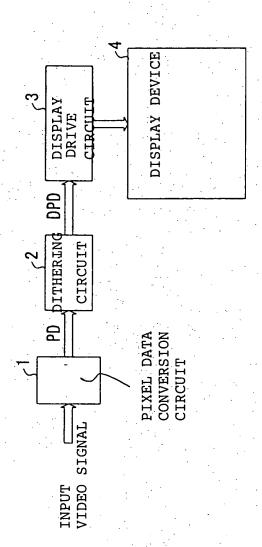Masahiro SUZUKI, et al. Q78534
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INPUT VIDEO SIGNAL
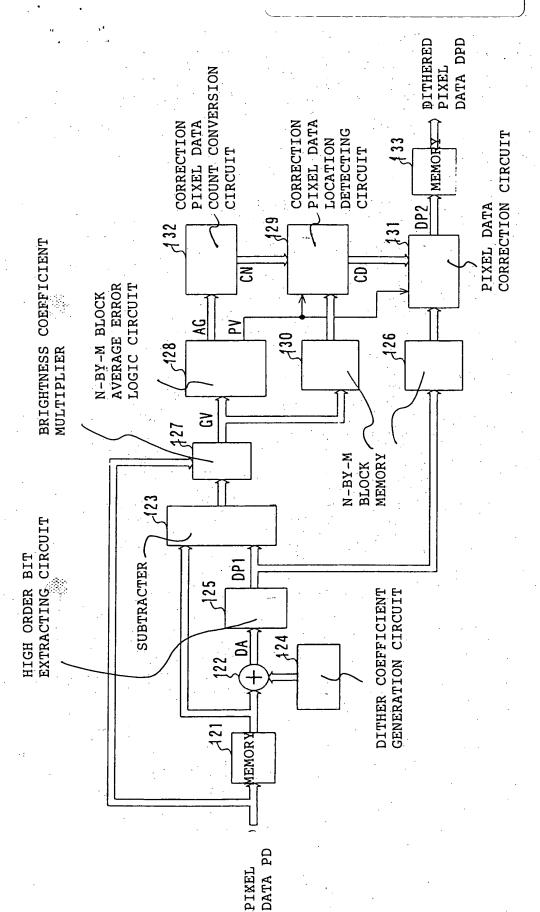
1

PIXEL DATA CONVERSION CIRCUIT

PD

2

DITHERING CIRCUIT

DPD

3

DISPLAY DRIVE CIRCUIT

4

DISPLAY DEVICE

FIG. 1

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FIG.2

G1	G2											
	$PD_{1,9}$	$PD_{2,9}$	$PD_{3,9}$	$PD_{4,9}$								
	$PD_{1,8}$	$PD_{2,8}$	$PD_{3,8}$	$PD_{4,8}$	$PD_{5,8}$							
	$PD_{1,7}$	$PD_{2,7}$	$PD_{3,7}$	$PD_{4,7}$	$PD_{5,7}$							
	$PD_{1,6}$	$PD_{2,6}$	$PD_{3,6}$	$PD_{4,6}$	$PD_{5,6}$							
	$PD_{1,5}$	$PD_{2,5}$	$PD_{3,5}$	$PD_{4,5}$	$PD_{5,5}$							
	$PD_{1,4}$	$PD_{2,4}$	$PD_{3,4}$	$PD_{4,4}$	$PD_{5,4}$							
	$PD_{1,3}$	$PD_{2,3}$	$PD_{3,3}$	$PD_{4,3}$	$PD_{5,3}$							
	$PD_{1,2}$	$PD_{2,2}$	$PD_{3,2}$	$PD_{4,2}$	$PD_{5,2}$							
	$PD_{1,1}$	$PD_{2,1}$	$PD_{3,1}$	$PD_{4,1}$	$PD_{5,1}$	$PD_{6,1}$	$PD_{7,1}$	$PD_{8,1}$	$PD_{9,1}$		$PD_{n,1}$	

$PD_{1,m}$ ... $PD_{n,m}$

FIG.3

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FIRST FIELD

0	8	2	10
12	4	14	6
3	11	1	9
15	7	13	5

(a)

SECOND FIELD

1	9	3	11
13	5	15	7
2	10	0	8
14	6	12	4

(b)

THIRD FIELD

15	7	13	5
0	8	2	10
12	4	14	6
3	11	1	9

(c)

FOURTH FIELD

14	6	12	4
1	9	3	11
13	5	15	7
2	10	0	8

(d)
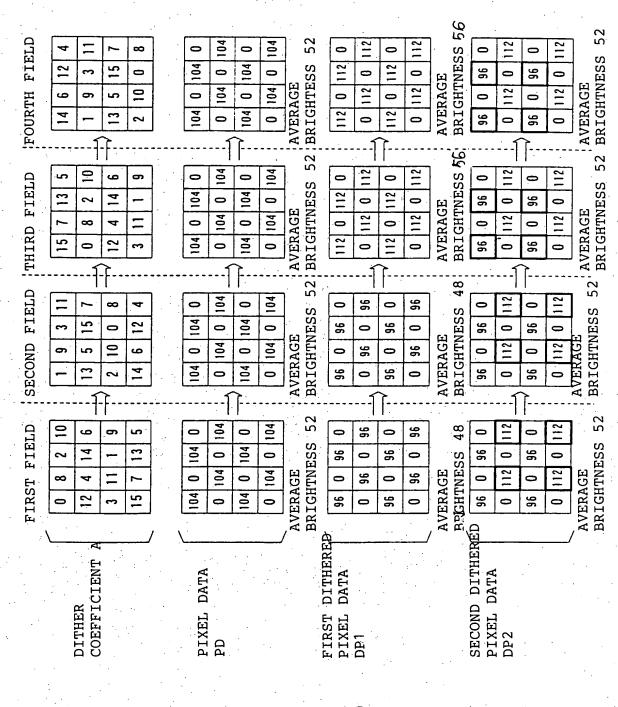
FIG. 4

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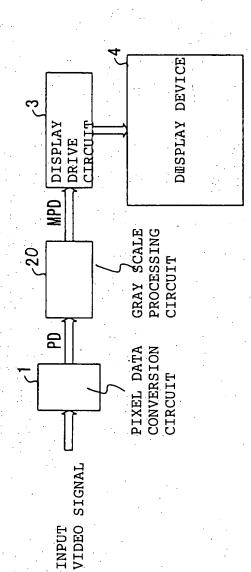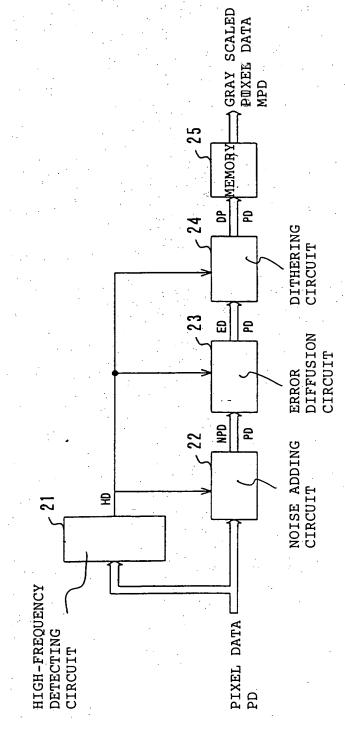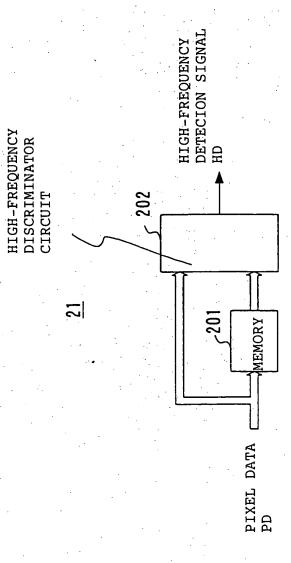
FIRST FIELD — SECOND FIELD — THIRD FIELD — FOURTH FIELD

DITHER COEFFICIENT A

First Field:
0	8	2	10
12	4	14	6
3	11	1	9
15	7	13	5

Second Field:
1	9	3	11
13	5	15	7
2	10	0	8
14	6	12	4

Third Field:
15	7	13	5
0	8	2	10
12	4	14	6
3	11	1	9

Fourth Field:
14	6	12	4
1	9	3	11
13	5	15	7
2	10	0	8

PIXEL DATA PD (AVERAGE BRIGHTNESS 52)

All fields:
104	0	104	0
0	104	0	104
104	0	104	0
0	104	0	104

FIRST DITHERED PIXEL DATA DP1

First Field (AVERAGE BRIGHTNESS 48):
96	0	96	0
0	96	0	96
96	0	96	0
0	96	0	96

Second Field (AVERAGE BRIGHTNESS 48):
0	96	0	96
96	0	96	0
0	96	0	96
96	0	96	0

Third Field (AVERAGE BRIGHTNESS 56):
112	0	112	0
0	112	0	112
112	0	112	0
0	112	0	112

Fourth Field (AVERAGE BRIGHTNESS 56):
112	0	112	0
0	112	0	112
112	0	112	0
0	112	0	112

SECOND DITHERED PIXEL DATA DP2 (AVERAGE BRIGHTNESS 52)

First Field:
96	0	112	0
0	112	0	96
96	0	112	0
0	112	0	96

Second Field:
96	0	96	0
0	112	0	112
96	0	96	0
0	112	0	112

Third Field:
96	0	112	0
0	96	0	112
96	0	112	0
0	96	0	112

Fourth Field:
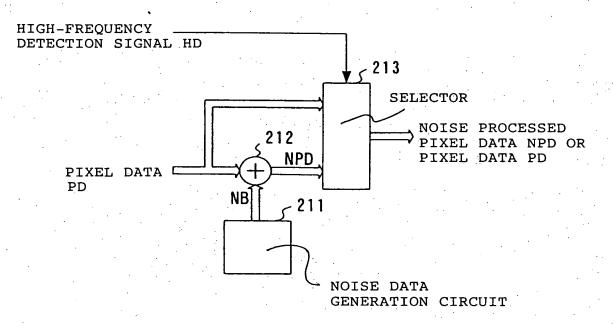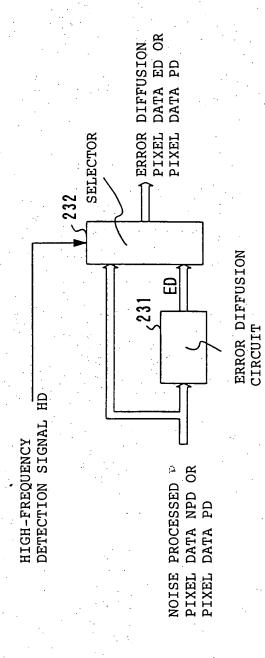| 96 | 0 | 112 | 0 |
0	96	0	112
96	0	112	0
0	96	0	112

FIG.5

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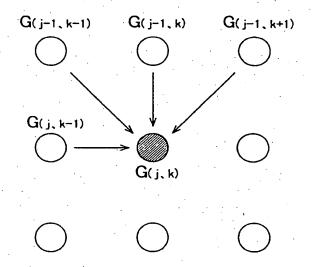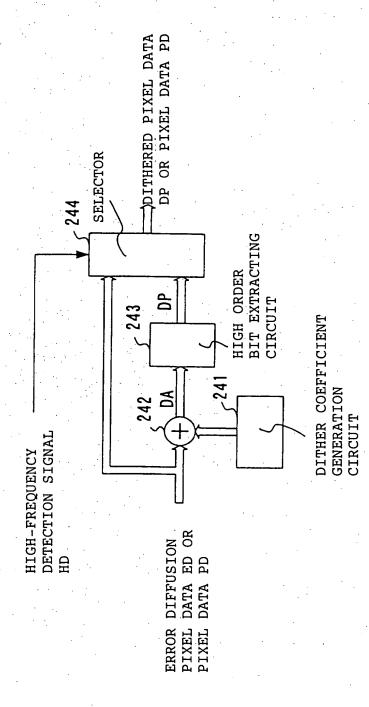Darryl Mexic 202-663-7909
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INPUT
VIDEO SIGNAL

1

PIXEL DATA
CONVERSION
CIRCUIT

PD

20

GRAY SCALE
PROCESSING
CIRCUIT

MPD

3

DISPLAY
DRIVE
CIRCUIT

4

DISPLAY DEVICE

FIG.6

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2

HIGH-FREQUENCY
DETECTING
CIRCUIT

21

HD

PIXEL DATA
PD

22
NPD
PD
NOISE ADDING
CIRCUIT

23
ED
PD
ERROR
DIFFUSION
CIRCUIT

24
DP
PD
DITHERING
CIRCUIT

25
MEMORY

GRAY SCALED
PIXEL DATA
MPD

FIG.7

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HIGH-FREQUENCY
DISCRIMINATOR
CIRCUIT

HIGH-FREQUENCY
DETECION SIGNAL
HD

21

202

201

MEMORY

PIXEL DATA
PD
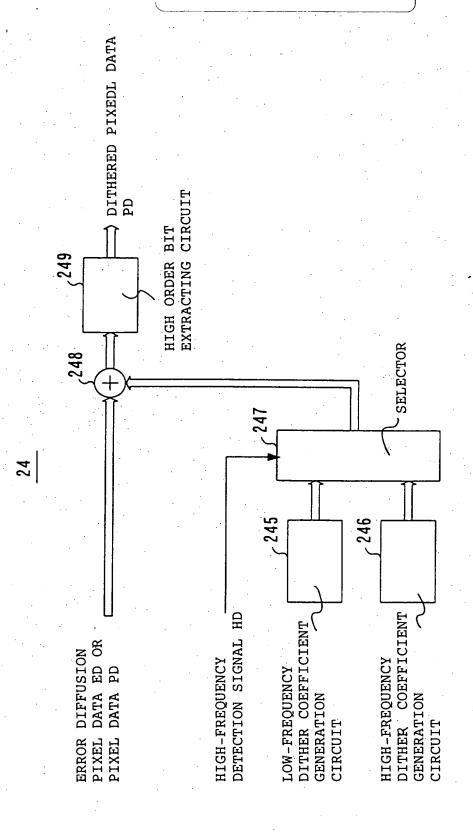
FIG. 8

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22

HIGH-FREQUENCY
DETECTION SIGNAL HD

213

SELECTOR

NOISE PROCESSED
PIXEL DATA NPD OR
PIXEL DATA PD

212

NPD

PIXEL DATA
PD

NB

211

NOISE DATA
GENERATION CIRCUIT

FIG.9

23

HIGH-FREQUENCY
DETECTION SIGNAL HD

232
SELECTOR

ERROR DIFFUSION
PIXEL DATA ED OR
PIXEL DATA PD

231
ED

ERROR DIFFUSION
CIRCUIT

NOISE PROCESSED
PIXEL DATA NPD OR
PIXEL DATA PD

FIG.10

G(j−1、k−1)   G(j−1、k)   G(j−1、k+1)

G(j、k−1)

G(j、k)

F I G . 11

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24

SELECTOR

244

DITHERED PIXEL DATA
DP OR PIXEL DATA PD

HIGH-FREQUENCY
DETECTION SIGNAL
HD

243

DP

HIGH ORDER
BIT EXTRACTING
CIRCUIT

242   241
DA

ERROR DIFFUSION
PIXEL DATA ED OR
PIXEL DATA PD

DITHER COEFFICIENT
GENERATION
CIRCUIT

FIG.12

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FIRST FIELD (a) → SECOND FIELD (b) → THIRD FIELD (c) → FOURTH FIELD (d)

LOW-FREQUENCY DITHER COEFFICIENT

FIRST FIELD (e) → SECOND FIELD (f) → THIRD FIELD (g) → FOURTH FIELD (h)

HIGH-FREQUENCY DITHER COEFFICIENT

FIG. 13

F I G . 1 4

FIG. 15